Photonic Instruments, 24th November 2011, Zurich

Dr.
Christoph Harder

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Dr. Christoph Harder received the Electrical Engineering Diploma from the ETH in 1979 and the Master and PhD in Electrical Engineering in 1980 and 1983 from Caltech, Pasadena, USA. He is co-founder of the IBM Zurich Laser Diode Enterprise which pioneered the first 980nm high power pump laser for telecom optical amplifiers.
He has been managing during the last few years the high power laser diode R&D effort in Zurich expanding, working closely with a multitude of customers, the product range into 14xx pumps as well as 808 and 9xx multimode pumps for industrial applications. He has published more than 100 papers and 20 patents and has held a variety of staff and management positions at ETH, Caltech, IBM, Uniphase, JDS Uniphase, Nortel and Bookham.

Nationalfonds: Technology Transfer
It is the main goal of the Swiss National Science Foundation (SNSF) to support scientific excellence but the SNSF supports also the transfer of their scientific science into commercial results. It is the goal of this workshop to foster this technology transfer within the NCCR MUST and we will present the different programs and mechanisms to support technology transfer.

Dr. Rafael Abela

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Ich wurde 1951 in La Paz, Bolivien, geboren, machte das Abitur in Spanien, studierte Physik in Karlsruhe und schrieb dort meine Dissertation in Teilchenphysik. Für die nötigen Experimente ging ich ans damalige SIN – heute PSI – und bin dann geblieben, da ich mich hier sehr gut entfalten und einen Beitrag zur Forschung leisten konnte.

The SwissFEL X-Ray Laser Project: Challenges and Opportunities
The Paul Scherrer Institute is planning the construction of a X-ray free electron laser (SwissFEL), which will produce 20 fs pulses of coherent x-rays in the wavelength range 0.1 to 7 nm, with extremely high peak brightness. These characteristics will provide opportunities for new experiments in chemistry, solid state physics, biochemistry and materials science. The presentation will present few examples of new research fields and mainly focus on the technical challenges of the planned facility in terms of diagnostics, laser systems, new measurement schemes, and detectors.

Prof. Dr.
Jean-Pierre Wolf

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Professor in Physics at the University Geneva- 2005 - now
Professor in Physics at the University Lyon 1- 1993 - 2005
Visiting Professor at Yale University (Applied Physics)- 1999 - 2000
Assistant Professor C1, Inst. for Exper. Physics, Free University Berlin- 1989-1992
Co-founder of *Elight Laser Systems GmbH*, Berlin - 1991
Project leader at the EPFL- 1987-1989
Assistant, Experimental Physics, EPFL- 1984 - 1987

Label Free Imaging and Bioassays
Significant progress has recently been achieved in developing novel bio-markers, such as frequency doubling nanocrystals, but the ultimate goal for cellular imaging would be to go *label free*. We will show how ultrafast coherent control might contribute towards this goal using only endogenous fluorophors, but also towards the development of label-free bio-assays.

Prof. Dr.
Thomas Feurer

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2004 - present: University of Bern, Switzerland: Co-Director, Institute of Applied Physics.
2001 - 2004 Massachusetts Institute of Technology, Cambridge: MA, USA, Department of Chemistry.
2001 Habilitation, Experimental Physics.
1994 - 2001 Friedrich-Schiller-University, Jena, Germany: Department of Physics.
1991 - 1994 Julius-Maximilians-University, Würzburg, Germany: Department of Physics.
1990 - 1991 Rice University, Houston, Texas, USA, Department of Electrical Engineering.

Electro-Optic THz Near-Field Imaging
I will start with a general introduction to the field of electro-optic detection of electromagnetic fields, specifically describe the effect, suitable crystals, and limitations an prospects. The second part will then focus on THz applications and introduce a THz near-field detection apparatus, which is able to detect all three vector components of the electromagnetic field with sub-wavelength precision. I will conclude with a few examples.

Prof. Dr.
Peter Hamm

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Peter Hamm studied physics at the Technical University of Munich, were he received his Diploma degree in 1991. He carried out his PhD studies under the guidance of Prof. Dr. W. Zinth at the Ludwig Maximilians University of Munich between 1991 and 1995. He then moved to the University of Pennsylvania, Philadelphia (Prof. R. M. Hochstrasser, 1996-1998). In 1999, he was appointed as an independent group leader at the Max Born Institute, Berlin. Since Oct. 2001, he is Professor at the Physical Chemistry Institute at the University of Zürich.

2D-IR Spectroscopy
I will briefly introduce the new possibilities 2D IR spectroscopy opens for analytical and functional studies of all sorts of question in chemical sciences. I will then discuss the technical challenges and possible solutions in view of a possible commercialization of this novel technique. Essentially, a commercialization will have to combine modern femtosecond laser technology with technology that is well established for FTIR spectrometers.

Dr. Carolina Medrano

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Carolina Medrano holds a PhD in physics from the National Autonomous University of Mexico (UNAM). From 1984 to 1986 she was a post-doctoral fellow at the Universidad Autonoma de Madrid. From 1987 to 1990 she was an associate professor at the Institute of Physics of the UNAM. In 1990 she joined the Nonlinear Optics Laboratory at ETH. Her main area of expertise includes organic functional materials for nonlinear optical, electro-optic, and THz wave applications as well as inorganic photosensitive materials for light processing, dynamic holography, phase conjugation, and frequency doubling for laser technology. She is a co-founder of Rainbow Photonics and is now in charge of the executive direction.

THz Equipment: State of the Art and Requirements for Next Generation Devices
In the last 10 years there has been a boom in the development of narrow band, broadband, and tunable sources of THz radiation. With THz waves it is possible to investigate molecular vibrations, inspect materials non-destructively, use these waves in security and biomedical applications. A road map of THz instrumentation will be presented.

Dr.
Sadik Hafizovic

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Sadik Hafizovic studied microsystem engineering at the University of Freiburg, Germany, and the Ritsumeikan University, Japan. He joined ETH in 2002 and received his doctoral degree in electrical engineering from ETH in 2006. In 2008, still at ETH as a postdoc, he co-founded the ETH spin-off Zurich Instruments. Today Sadik Hafizovic is CEO of Zurich Instruments AG, which has grown from 3 to 18 people three years after incorporation.

Dynamic Signal Analysis for Academic and Industrial Applications
Measurement technology is experiencing rapid advances thanks to the dramatic progress of digital integrated circuits. Zurich Instruments, a 4 year ETH spin-off, has followed the example of big companies like Rohde & Schwarz and Agilent, and has introduced strong products in the dynamic signal analysis market. Today ZI offers best-in-class impedance spectroscopes, phase-locked loops, frequency response analyzers, and lock-in amplifiers. This presentation will present products and applications with focus on oscillation control, PLLs and lock-in amplifiers and we will conclude with an outlook on the product roadmap of Zurich Instruments.

Dr.
Patrick Lambelet

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During 12 years of research, Patrick Lambelet built up a strongexperience in the optics field: non-linear optics (photorefractive crystals, frequencydoubling), lasers (semi-conductor lasers), optical instruments (near-field microscopy) and measurements (low coherence reflectometry). In 1999, he created the company *Brightpower*, which is producing high-brightness fiber-coupled laser modules. In the domain of optical coherence tomography (OCT) he developed a calculation method to interpret the OCT measurements realized on bragg gratings in optical fibers. Following the success of this method, he built a reflectometer used to investigate photorefractive crystals. More recently in 2005, he brought his experience to this field by building a model to understand the signals of parallel OCT in turbid (diffusing) media.

High-speed Lock-IN CMOS camera with pixel-level signal processing
Heliotis developed a CMOS sensor able to perform Lock-IN detection of a modulated signal up to 250 kHz. The in-pixel integrated circuit measures the amplitude and phase of the signal and can return up to 5000 I/Q values for the 300x300 pixel. This camera can be used for interferometric 3D measurements as well for high sensitivity fast imaging spectral measurements.